PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-163685
(43)Date of publication of application : 16.06.2000

(51)Int.Cl. G08G 1/00
G06F 15/18
G06T 1/00
G08G 1/01

(21)Application number : 10-340212
(22)Date of filing : 30.11.1998

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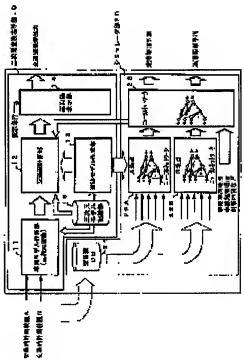
(54) TRAFFIC FLOW MONITORING SYSTEM

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a traffic flow monitoring system which can simulate a countermeasure that is taken against a traffic jam and can be recognized easily on a screen by a traffic controller and to which the experimental judgment of human beings is added.
SOLUTION: A traffic flow monitoring system finds the size, speed, etc., of each vehicle through picture processing based on measurement data obtained from measuring instruments installed to a road. Then the system finds the corresponding three-dimensional vehicle model of each vehicle by means of a vehicle calculating section based on the size, speed, etc., of each vehicle and displays the model and makes each model to run on a road model found from a road picture generated by means of a road model calculating section 13. In addition, the system inputs the measurement data to first neural networks 22A and 22B provided at every spot and predicts a traffic jam by inputting the outputted results of the networks 22A and 22B to a second-stage neural network 23.



* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the traffic-flow monitoring system which is based on information at the traffic-flow monitoring system which supervises the flow of traffic from **** and the traffic-flow metering device currently installed as a road facility in more detail, and grasps and manages the traffic situation of a road.
[0002] This invention relates to the simulation function of the road delay situation in traffic-flow monitoring system again.
[0003]
[Description of the Prior Art] Having grasped the road situation, the traffic-flow monitoring system for performing management and control of the flow of traffic collected information from the metering device installed in every place of roads, such as the branch point and a juncture, performed various directions and control based on this, and has managed a traffic flow.
[0004] The thing of the type which generates a supersonic wave and light as a metering device which measures the traffic flow of a current road, and measures a car rate and the number of passage, or a loop-formation coil mold is in use, and the metering device of the image-processing mold which will use the image data of an ITV camera from several year before is developed, and it is used. The number (it classifies into two types of a car of an about [5.5m] large-size car and the standard-sized car not more than this, and measures.), car rate, and pulse duty factor of the car to pass are one of those these metering devices generally measure. Moreover, in addition to these, detection of abnormality transit cars, such as measurement of car spacing and traffic congestion (merit) and a driving-backward line of a car, etc. is performed.
[0005] Such information is brought together in a center or two or more control rooms, and is used as data which grasp a traffic situation. At each control room, the collected data are shown a trend table and a document output is carried out as accumulation data of an output or 5 minutes, 10 minutes, and 15-minute spacing.
[0006] A road administrator judges experientially a cure in the delay situation by lane regulation, accident construction, etc. based on these data from the control interior of a room, and is performing road management. The method of this management changes change spacing of a signal based on this data, or expresses delay etc. to a path on the street as a general path. Moreover, as for these data, the data of traffic are used also as information on tunnel ventilation control with other facilities, for example.
[0007] Moreover, the simulator function of a traffic flow gets down to traffic-flow monitoring system as **, and it is used for delay prediction etc. In the simulator of this traffic flow, a delay situation etc. is simulated from various information, such as car property data, such as traffic property data, such as capacity of a road map or a road, data of the geometric structure of a road, traffic, and a rate of

right-and-left chip box rectilinear propagation, a signal cycle, and average deceleration, and the traffic in an every place point, the amount of point moderation, travel time, a car consistency, etc. are outputted.

[0008]

[Problem(s) to be Solved by the Invention] There are the following troubles in such conventional traffic-flow monitoring system.

[0009] Although it is trend-table-shown or a document output is carried out on a screen, in these output forms, the measurement data first collected from the metering device of a site is incomprehensible, and it is difficult for it for a manager to fully grasp the situation of a site. Therefore, although the case where a manager needs to supervise by displaying the image of a site on a screen comes out, the image data sent to a control room in this case serves as magnitude huge as the amount of data. Therefore, cost starts facility maintenance of an equipment, an image circuit, etc. which transmit image data.

[0010] Moreover, the cure to delay by the conventional traffic-flow monitoring system was performing correspondence by the decision based on [in a manager / based on data such as traffic,] experience of human being by the class of delay factors, such as car regulation and construction, etc. And since the manager is making a judgment over such a delay situation from document data, he will require time amount for status tracking, and it will take him time amount to actually correspond. Although a manager has to predict a delay situation quickly and has to correspond to catastrophic failure etc., it is difficult to grasp a road situation in the conventional traffic-flow monitoring system in an instant, and to take the measures to delay.

[0011] This invention aims at offering traffic-flow monitoring system with simulation **** which can offer the information for the cure exchange which the manager has grasped easily from the display screen, and considered the humane decision based on the past experience in view of the above-mentioned trouble.

[0012]

[Means for Solving the Problem] The traffic-flow monitoring system by this invention manages the flow of a car based on the measurement data from the metering device installed in the road, and is equipped with a car model count means, a road model creation means, a traffic-flow count means, and a display means.

[0013] A car model count means asks for the car model which compares with the ratio of the magnitude of for example, each car model the ratio of the magnitude of the car above-mentioned path on the street for which compared the above-mentioned measurement data and each car model which are sent from the above-mentioned metering device to a car path on the street, for example, it asked from image data, and corresponds.

[0014] A road model creation means creates a road model using the map information on a road, and the components model of a road.

[0015] A traffic-flow count means searches for the flow on the road model which the above-mentioned road model creation means of the car model for which the above-mentioned car model count means asked based on the above-mentioned measurement data created. this -- based on the measurement data from two or more above-mentioned metering devices, a traffic-flow count means carries out interpolation processing, and asks for a traffic flow between two or more metering devices again.

[0016] A display means carries out the moving state display output of the above-mentioned car model on the above-mentioned road model based on the flow which the above-mentioned traffic-flow count means searched for. Moreover, this display means can also indicate the information based on the measurement data based on the above-mentioned metering device by overlay to the moving state output of the above-mentioned car model. furthermore, the above-mentioned display means -- the above-mentioned road model top -- the above-mentioned car model -- two dimensions -- or a

three-dimensions moving state display output is carried out. Moreover, in case a display means performs a three-dimensions moving state display, based on the setups of the camera of a metering device, it carries out three-dimensions conversion of the above-mentioned car model and the components model of a road, and carries out the moving state display output of the above-mentioned car model on the above-mentioned road model.

[0017] Moreover, the traffic-flow monitoring system by this invention is equipped with a traffic-flow database, two or more neural networks of the 1st step, the neural network of the 2nd step, and a display means as a means for the function of delay prediction of a road.

[0018] A traffic-flow database puts in a database and memorizes the measurement data from the above-mentioned metering device.

[0019] The neural network of the 1st step is prepared to each metering device, respectively, and outputs a forecast to the entry of data from the above-mentioned traffic-flow database.

[0020] The neural network of the 2nd step outputs delay prediction from the forecast which the neural network of the 1st step of the above-mentioned plurality outputs.

[0021] A display means carries out the moving state display output of the car model on a road model based on the output value from the neural network of the 2nd above-mentioned step.

[0022] According to this invention, a car path on the street can be modeled and the road model top can be indicated by the moving state based on a traffic flow.

[0023] Moreover, since a car model and the components model of a road are changed and it displays on a screen based on the setups of the camera of a metering device, the display by various conditioning, such as change of a view, can be performed.

[0024] Furthermore, at the time of a delay simulation, change of a traffic flow to the past cause of delay from data and its past cure can be grasped.

[0025] Moreover, high delay prediction of precision is attained by using two steps of neural networks.

[0026]

[Embodiment of the Invention] One operation gestalt of this invention is explained below, referring to a drawing.

[0027] Drawing 1 is the functional block diagram of the traffic-flow monitoring system in this operation gestalt. Let traffic-flow monitoring system of drawing 1 be the system which is based on data from the metering device currently installed in two junctions of Points A and B, and supervises and controls a traffic flow for simplification of explanation. In addition, also when the traffic-flow monitoring system by this invention does not perform monitor and control of a traffic flow based on such two measurement data, and processing the data from a measurement location installed in actual further many parts and performing monitor and control of a traffic flow, it can be applied easily.

[0028] The measurement data sent to the traffic-flow supervisory equipment of a control room from the traffic-flow metering devices A and B, such as a loop-formation coil mold installed in the road side of a road etc., and an image-processing mold It is the image data for every lane, large-sized and the number of a small car (from the die length of a car to decision), each car rate, the distance between two cars, a migration coordinate, delay length, etc., and these measurement data are brought together in a control room, and are inputted into three-dimensions conversion and the display 10 of traffic-flow supervisory equipment 1.

[0029] Three-dimensions conversion and a display 10 consist of the car model count section 11, the traffic-flow count section 12, the road model creation section 13, the three-dimensional display section 14, and the three dimensional object model storage section 15.

[0030] The car model count section 11 specifies the class of car as compared with the data value of the frame model of the car which creates the measurement data from traffic-flow supervisory equipment, and beforehand, and has been recorded on the three dimensional object model storage section 15. About this point, it mentions later.

[0031] The road model creation section 13 creates the road model of the monitor range using the map

information currently recorded on the three dimensional object model storage section 15, and each part article model of a road. A road model is the image model which creates from the information on a map , and the road model creation section 13 sets and creates the components model of the image corresponding to the facility outside the road of road facilities , such as a road shoulder currently record on the three dimensional object model storage section 15 , and a signal , a building , etc. to information , such as the location of the information about roads , such as road length which has get from the map in advance , lane width , a flow direction , branching , and unification , or the building around a road , and magnitude , Moreover, the road model creation section 13 can also be considered as a configuration equipped with the function to change a road model, based on the measurement data from traffic-flow metering devices, such as generating of lane regulation for example.

[0032] The traffic-flow count section 12 searches for the flow of cars, such as the number of a car which flows to per unit time amount to a large-size car and each small-size car, and a car rate, in response to the data from the car model count section 11, and moves the car model based on a type of a car on the road model which the road model creation section 13 created.

[0033] The three-dimensional display section 14 displays the moving state screen which used-dimensional [2] or a three dimensional object model on the screen based on the output of the traffic-flow count section 12. Moreover, a three dimensional object model is changed to modification of a setup, such as modification of the height of a view.

[0034] The three dimensional object model storage section 15 is recording the data which three-dimensional-object-model-ized road facilities, buildings, etc., such as a car and a signal, a display board, and a camera, and is read if needed. This three dimensional object model is memorized by the three dimensional object model storage section 15 based on distance and an include angle with a camera in the form modeled so that the linear transformation of that way of being visible could be carried out freely.

[0035] Moreover, the measurement data from a traffic-flow metering device are sent also to the simulator section 20, and are used as data for the simulation of a traffic flow. This simulator section 20 is equipped with the neural network currently learned in advance with the forecast based on the past experience. This neural network outputs the result that the weight inside a neural network was automatic-decision-based on the past contents of study based on the I / O data in the process of study. Therefore, the forecast which considered the humane decision based on the past experience by this neural network can be outputted.

[0036] The simulator section 20 consists of a traffic-flow database 21, a neural network 22 of the 1st step for every every place point, and a neural network 23 of the 2nd step.

[0037] The measurement data from the traffic-flow metering devices A and B at each measurement point are put in a database by the traffic-flow database 21 with a measurement location, an assay date, and the measuring time, and sequential record is carried out. Moreover, in this traffic-flow database 21, the data to roads, such as switching time of each signal, road distance, and lane width, are also stored, and it is read if needed with the data from a traffic-flow metering device at the time of a simulation.

[0038] The neural network 22 of the 1st step is formed for every measurement point, and, in the case of drawing 1 , two, 22A for A points and 22B for B points, are prepared. By making the forecast have used and learned in advance and making it learn using the dissolution time amount of the delay at the time of each past traffic data and lane regulation, weighting of the weighting factor can be carried out to the description of delay dissolution time amount, and dissolution prediction of the delay to the present traffic can be given to these neural networks 22 now. At the time of simulation activation, the data to those roads, such as distance of the road read from the traffic-flow database 21 to this neural network 22 in consideration of the moon, a day of the week, a time zone, etc., switching time of a signal, and the number of lanes, and the data of traffic flow, such as the number of a car and the vehicle length which pass in that time amount time zone, and a rate, are given, and forecasts, such as

time amount required by the dissolution of delay distance or delay, are made to output to it.
[0039] these every -- the output value of the neural network 22 of the 1st step is inputted into the neural network 23 of the 2nd step, respectively, and performs high prediction of precision more. Although the neural network of the 1st step is performing delay prediction only in consideration of A point and B point, and the area of a particular part in which the traffic-flow metering device is installed, delay time amount, delay length, etc. are influenced of the actual more large range. Therefore, it is necessary to carry out by taking into consideration the prediction result in the area of others [raise / the precision of a forecast]. For this reason, with this operation gestalt, a neural network be make a two - step configuration and the forecast of the delay length who took the whole into consideration by the neural network 23 of the 2nd step by using as input data the delay distance in the every place point performed by the neural network 22 of the 1st step, the forecast of the time amount to a delay dissolution and an accident car point, a lane regulation location, the contents of a cure, etc., and delay time amount be output. The screen output of this forecast is carried out as a moving state display through the three-dimensions conversion and the display 10 as numeric data.
[0040] Drawing 2 (a) is the explanatory view of modeling of the car in this operation gestalt.
[0041] With this operation gestalt, the width of face (w) of a car, height (h), and die length (d) are found from the image data based on the ITV camera of a traffic-flow metering device, these ratios are compared with the ratio of the width of face (w) of a frame model like drawing 2 (b) which carries out modeling and which has been recorded in advance, height (h), and die length (d), and a type of a car is specified. And the car model corresponding to this type of a car is developed on-dimensional [2] or a three-dimensions road model. In addition, although measurement of w, h, and d from this image data is performed by the traffic-flow metering device and a measurement result is sent to traffic-flow supervisory equipment, it is good also as a configuration which asks traffic-flow supervisory equipment for w, h, and d for image data by delivery and the car model count section 11.
[0042] In drawing 2 , since the car 31 on image data has [a car 32] the ratio of w, h, and d close to the ratio in the frame model 37 of a large-sized car to the model frame model 36 of a small car, a car 31 is specified with a small car and a car 32 is specified with a large-sized car. Moreover, since the ratio of w, h, and d of which frame model is not similar, 33 on image data is treated as a falling object path on the street. Thus, the cars 31-33 on image data are changed into the car models 34-36. In addition, although the frame model in drawing 2 is only two kinds, the amount of large-size cars, and a small car, it is better than a two-flower vehicle etc. also as a configuration using many frame models.
[0043] Drawing 3 is drawing explaining how to find the width of face (w) of a car, height (h), and die length (d) from on image data.
[0044] The conversion in actual size from image data asks for data empty vehicle both sizes, such as height of a camera, and a distance (it measures from reference value of lane beforehand) camera include angle with a car.
[0045] The location of the car on the image data which is a secondary flat surface first is changed into a three-dimensions coordinate. This conversion puts a reference point on a path on the street on the assumption that it says [that a vehicle surely exists in a path on the street], and as shown in drawing 3 (a), the location seat table of a car is changed. In this case, conversion of a real co-ordinates (X, Y, Z) is given by the degree type from a camera coordinate (x y).
[0046]
X=x-H/(y-costheta+f-sintheta)
Y=(f-costheta-y-sintheta) -H/(y-costheta+f-sintheta)
As shown in Z=0 drawing 3 (b), f in an upper type is [the height of a camera and theta of the focal distance of a camera lens and H] the inclinations of a camera. In addition, these values are set [H / of a camera / height] up as a drawing certified value 25.8 degrees in 7.5m and Inclination theta. Moreover, die length of 8m of Chuo Line and the distance from a camera to Chuo Line are set up as 14m as an auxiliary data. These values are used when the comparison object when measuring in the

size of a car and Chuo Line are used. In addition, the value which changes with established states of a camera with these actual set points, respectively is set up.
[0047] If the real co-ordinates of each point of a car can be searched for, it can ask for magnitude after this. Thus, although w, h, and d of a car can be found, height h which can be found here is the height on appearance, and differs from the height of an actual car.
[0048] It sees in drawing 4 and the relation between upper height h' and actual height h is shown.
[0049] When the slash section of drawing 4 is used as a car, and the relation between height h' on the appearance of the car and actual height h is expressed with a formula, it is h'=(d-H+L-h)/(L+d) from a triangular ratio.
It becomes. The inside L of an upper type points out the distance from a zero to the rear of a car, and d points out the die length of a car. This sees and height h of an actual car can be found from upper height h'.
[0050] Moreover, on image data, the distance between cars will narrow and between [of it] front cars will be soon lost as a car separates from the installation location of a camera. Then, height h' on the appearance drawn from image data will become the height for two sets. Drawing 5 is the explanatory view of change of the height on the appearance according [these two sets] to duplication.
[0051] Although it sees correctly and can ask for upper height h' since the car in the location near a camera does not lap with the car of order, the car 41 in the location distant from the camera laps with the car 42 before that, and it becomes impossible to measure the height on appearance correctly. in this case, when it laps, height should become h" in drawing and, originally should become smaller and smaller -- ** -- it becomes large suddenly. Therefore, misconception of the height by duplication on the car before and behind this can be detected by tracing each car from from, when a car is near a camera. That by which duplication of a car was detected by this can prevent misconception of the height by car duplication by removing as data or using the data before duplication as it is.
[0052] Drawing 6 is an example of a screen display which is an output by traffic-flow monitoring system. The display screen of drawing 6 is the example of the 2-dimensional moving state display screen for grasping a traffic flow from a screen, and displays the car model which the traffic-flow count section 12 computed on the road model which the road model creation section 13 created.
[0053] A car model moves in a road model top corresponding to the number of cars, or a car rate based on measurement data, such as an ITV camera from the metering device with which the display screen of drawing 6 was installed in A point and B point. Moreover, the graphs, such as a rate to every direction in the information for every time amount based on the data from a traffic-flow metering device, for example, the number of car passage and a junction, etc. are indicated by overlay. Moreover, the image data of an ITV camera may be made to transmit from a traffic-flow metering device if needed, and this may be indicated by overlay. A monitor supervises a traffic flow on many sides, looking at these data.
[0054] The traffic-flow count section 12 computes migration length and passing speed in case the car model corresponding to the type of a car for which it asked in the car model count section 11 runs the road model top which the road model creation section 13 created. Based on this, the car model of the number corresponding to the number of passage moves in a screen top corresponding to the rate and direction which were measured. The magnitude of the car model on ****** shows the class of car, for example, the large car model 51 shows a large-sized car, and the small car model 52 shows the small car.
[0055] Moreover, the traffic-flow count section 12 asks for the car number of every direction based on the measurement data in a junction, and the three-dimensional display section 14 displays the car model corresponding to this number for every direction.
[0056] Furthermore, the traffic-flow count section 12 performs interpolation processing between measurement points. For example, although a metering device does not exist between A point and B point, the flow of the car in such a point carries out delay dissolution prediction of the delay length

based on the situation of the highway in measurement value empty vehicle both the number of A point and B point, transit time, passing speed, the amount of moderation in a curve and acceleration, the right and left chip box average deceleration near a signal, and the interchange outflow section, the signal time amount of a general path, the distance of a road, etc.

[0057] Moreover, at the time of the simulation of delay prediction, a traffic flow is expressed in the same display screen as drawing 6 from the data of the traffic flow of the past read from the traffic-flow database 21 in consideration of the moon, the day of the week, the time zone, etc. The information about the generating factor of delay, such as the occurrence of accident and lane regulation, its location, and a counterplan for congestion is further inputted into the 2nd neural network 23 in this condition. As a result from the 2nd neural network 23, the prediction result of delay, for example, the distance of delay, the time amount to the dissolution of delay, etc. are outputted. And while a screen display of this output is carried out, the flow of the car model on drawing 6 also changes based on this output.

[0058] Next, the example of the three-dimensions moving state display screen by the three dimensional object model by traffic-flow monitoring system is shown in drawing 7 .

[0059] As shown in this drawing (a), drawing 7 (b) three-dimensional-object-model-izes the image when installing a camera, and displays it on a crossing with a height of 10m. On the occasion of modeling of this drawing, the lane width of 3.5m, width of face of 2.5m of the road shoulder, the inclination of 12.8 degrees, the field angle of 10.9 degrees, and visual fields 25m-200m were set up as a condition value.

[0060] In the three-dimensions moving state display screen of drawing 7 (b), the flow of a car is expressed with the class of car based on the data from a traffic-flow metering device, a location, a rate, and a car consistency, and the car which had the road model top using a three dimensional object model modeled moves it corresponding to the rate and consistency.

[0061] Moreover, in the display image by the three dimensional object model of drawing 7 , by changing a condition value, the false display of a different screen configuration from the installation condition of an actual camera can be performed, and a display change is freely made so that it may be in a proper display condition.

[0062] The example of the display image which changed the conditions of the height of a camera into drawing 8 is shown.

[0063] 1.2m whose drawing 8 (a) is the locations (operation at the assembly location of a small car) of human being's look -- moreover, this drawing (b) is an example of a screen by the three dimensional object model at the time of moving a camera to the location higher than 6m which is an installation location of an actual camera. Thus, if setups, such as a location (height of a look) of a camera, an include angle and the height of the structure, and magnitude, are changed, in connection with it, the three-dimensional display section 14 will perform the three-dimensions moving state display by the components which constitute a road model, and the view which carries out three-dimensions conversion of the car model, and corresponds. Various looks and how to be visible can be verified by this, and a display condition can be freely changed into a proper thing. In addition, the example of a display of drawing 8 set [the magnitude of a camera] up 40cm by 160cm, and height for the 20 longcmx width-of-face [of 20cm] x depth of 40cm, and the magnitude of a signal as 6m.

[0064] The example of a system configuration of traffic-flow monitoring system is shown in drawing 9 . The data from the traffic-flow metering device 70 of the number which becomes the traffic-flow metering device of an image-processing mold from the ITV camera installed in the every place point - ten numbers are inputted into the connection 64 of an image processing system 60. The data from this traffic-flow metering device 70 are changed into the data in which the number of a large-sized car, the number of a small car, each car rate, and each car size are shown for every lane by two or more measurement units 63.

[0065] Next, with each car size, modeling is carried out from actual vehicle length and breadth of a car

in the three-dimensions transform-processing unit 60, and it changes into three-dimensions data. The measurement data of ****** are sent to a video display terminal 80 by the control communication link unit 60 through a connection 64, and give-dimensional [2] / three-dimensions moving state indication on a screen in a video display terminal 70. Moreover, this-dimensional [2] / three-dimensions moving state display screen are made to overlay the notice data of abnormalities from the graph and image processing system of the number of passage, such as every type of a car, every lane, and a destination (every etc.), of a need ****** measurement point, visibility data, etc., and it displays on it. Moreover, when it is the configuration that direct image data is sent from the traffic-flow metering device 70, a moving state display image may be made to overlay this raw image data, and it may be displayed.

[0066] The example of another configuration of traffic-flow monitoring system is shown in drawing 10 (a). The configuration of drawing 10 (a) is the example of a system configuration with a traffic control system made to cooperate, in the control room 90, traffic-flow supervisory equipment 94 is connected with a traffic control system 91 by the bus 95, and exchanges data of each other, and manages a road organically. It is the personal computer 93 for adjustment, and it is for adjusting traffic-flow metering devices, such as a set point input. In addition, this personal computer 93 for adjustment is not formed independently, but is good also as traffic-flow supervisory equipment 94 and one configuration.

[0067] The image data photoed with the ITV camera 111 and the image data by which was photoed by beforehand and the playback output was carried out with the videocassette recorder 112 are inputted into the traffic-flow metering device 100 through an image change-over machine / frame memory unit 110. In the traffic-flow metering device 100, the magnitude of a car, a location, a rate, etc. are found from this image data, and this is sent to the control room 90. At the control room 90, traffic-flow supervisory equipment 93 manages this data, and a screen display like the drawing 10 (b) lower berth is performed to the terminal unit 92 connected in self or a network 95 based on this data.

[0068] Moreover, traffic-flow supervisory equipment is connected with the public line 120 by network connection equipments, such as a modem, and the animation of the situation of the traffic flow of an every place point is displayed on a terminal unit 121 as a model image of three dimensions from the exterior of the control room 90 by connecting with the traffic-flow monitor 94 with a public line 120 and the terminal unit 121 in which communication link connection is possible. Thereby, a road administrator can check a traffic-flow situation also from the exterior of the control room 90. The example of a display is shown in the drawing 10 (b) upper case. The example of the display screen in drawing is an example in which the every place point carried out still picture image display to the traffic-flow measurement display according to the direction of an every place point. In this case, since it is data for the modeled moving state display, as compared with transmitting raw image data, traffic becomes small, and being sent to a terminal unit 121 from traffic-flow supervisory equipment 94 can measure real time-ization of a screen display.

[0069]

[Effect of the Invention] Since modeled image display is performed according to this invention, the communication link amount of data ends few rather than it exchanges the image data itself. Therefore, improvement in the speed of processing can be timed, and low cost-ization of a facility can be realized.

[0070] Moreover, since a manager can check the flow of traffic by animation display of the modeled car, he can perform status tracking easily and can respond promptly to catastrophic failure etc. Furthermore, it can display on the animation of this modeled car combining static images, such as a graph, and status tracking can be performed more easily.

[0071] Furthermore, since a false display change of a three dimensional image based on modification of the installation conditions of a camera can be made, it can carry out freely, checking modification at a more legible view.

[0072] Moreover, delay situations accompanying [using a neural network, when drawing generating is

carried out] it, such as lane regulation and catastrophic failure, can be predicted from the past data, and the cure support information which considered the humane decision based on the past experience can be offered. Moreover, a forecast with a more high precision is obtained by having made the neural network the two-step configuration.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram of traffic-flow supervisory equipment.
[Drawing 2] It is drawing explaining the modeling of a car.
[Drawing 3] It is drawing explaining how to find the width of face (w) of the car from image data, height (h), and die length (d).
[Drawing 4] It is drawing showing the relation between height h' on appearance, and actual height h.
[Drawing 5] It is drawing showing change of height h' on the appearance by doubleness of a car.
[Drawing 6] It is the example of the 2-dimensional moving state display screen by traffic-flow supervisory equipment.
[Drawing 7] It is the example of the three-dimensions moving state display screen of the image by the installation location conditions of a camera.
[Drawing 8] It is the example of the three-dimensions moving state display screen at the time of changing the height of a look.
[Drawing 9] It is drawing showing the example of a system configuration.
[Drawing 10] It is drawing showing the system configuration made to cooperate with a traffic control system.
[Description of Notations]
1 Traffic-Flow Monitoring System
10 Three-Dimensions Conversion Display
11 Car Model Count Section
12 Traffic-Flow Count Section
13 Road Model Creation Section
14 Three-dimensional Display Section
15 Three Dimensional Object Model Storage Section
20 Simulator Section
21 Traffic-Flow Database
22 Neural Network of 1st Step
23 Neural Network of 2nd Step

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] In the traffic-flow monitoring system which manages the flow of a car based on the measurement data from the metering device installed in the road A car model count means to ask for the car model which compares said measurement data and each car model which are sent from said metering device to a car path on the street, and corresponds, The map information on a road, and a road model creation means to create a road model using the components model of a road, A traffic-flow count means to search for the flow on the road model which said road model creation means of the car model for which said car model count means asked based on said measurement data created, Traffic-flow monitoring system characterized by having the display means which carries out the moving state display output of said car model on said road model based on the flow which said traffic-flow count means searched for.
[Claim 2] Said car model count means is traffic-flow monitoring system according to claim 1 characterized by comparing with the ratio of the magnitude of each of said car model the ratio of the magnitude of the car said path on the street for which it asked from image data, and asking for a corresponding car model.
[Claim 3] Said traffic-flow count means is traffic-flow monitoring system according to claim 1 or 2 characterized by carrying out interpolation processing and asking for a traffic flow between two or more metering devices based on the measurement data from said two or more metering devices.
[Claim 4] In the traffic-flow monitoring system which manages the flow of a car based on the measurement data from the metering device installed in the road The traffic-flow database which puts in a database and memorizes the measurement data from said metering device, With two or more neural networks of the 1st step who are prepared to each metering device and output a forecast to the entry of data from said traffic-flow database With the neural network of the 2nd step who outputs delay prediction from the forecast which said two or more neural networks of the 1st step output Traffic-flow monitoring system characterized by having the display means which carries out the moving state display output of the car model on a road model based on the output value from said neural network of the 2nd step.
[Claim 5] Said display means is claim 1 characterized by indicating the information based on the measurement data based on said metering device by overlay at the moving state output of said car model thru/or the traffic-flow monitoring system of four given in any 1 term.
[Claim 6] Said display means is claim 1 characterized by carrying out the 2-dimensional moving state display output of said car model on said road model thru/or the traffic-flow monitoring system of four given in any 1 term.
[Claim 7] Said display means is claim 1 characterized by carrying out the three-dimensions moving state display output of said car model on said road model thru/or the traffic-flow monitoring system of four given in any 1 term.
[Claim 8] Said display means is traffic-flow monitoring system according to claim 7 characterized by carrying out three-dimensions conversion of said car model and the components model of a road, and

carrying out the moving state display output of said car model on said road model based on the setups of the camera of said metering device.

[Translation done.]